




Article

Eco-Labeling and Retailer Pricing Strategies: The U.K. Haddock Market

Dengjun Zhang ^{1,2,*} , Geir Sogn-Grundvåg ³, Frank Asche ^{4,5} and James A. Young ⁶¹ Business School, University of Stavanger, Stavanger 4036, Norway² CAPIA AS, Tromsø 9252, Norway³ The Norwegian Institute of Food, Fisheries and Aquaculture Research (Nofima), Tromsø 9291, Norway; geir.sogn-grundvag@nofima.no⁴ The Institute for Sustainable Food Systems, School of Forest Resources and Conservation, University of Florida, Gainesville, FL 32611, USA; frank.asche@ufl.edu⁵ Department of Industrial Economics, University of Stavanger, Stavanger 4036, Norway⁶ Marketing and Retail Division, University of Stirling, Stirling FK9 4LA, UK; j.a.young@stir.ac.uk

* Correspondence: dengjun.zhang@uis.no; Tel.: +47-51-83-25-62

Received: 23 March 2018; Accepted: 8 May 2018; Published: 11 May 2018



Abstract: In attempts to differentiate their store imagery, grocery retailers frequently introduce new products, which are often rich in extrinsic attributes such as claims regarding healthiness and environmental sustainability. This paper explores retailers' pricing strategies for product attributes of haddock in the United Kingdom. The results show that retailers' pricing strategies vary, in particular for extrinsic product attributes such as eco-labels and country-of-origin. The high price premium generated from the most advocated eco-labels and an emphasis upon promotion strategies appear to play a role in the success of high-end retailers, and may have implications for any heightened competitive responses by larger retail chains in the future.

Keywords: product differentiation; retail pricing; hedonic price model; sustainability; eco-labels; haddock

1. Introduction

The grocery retail market has become increasingly competitive and is characterized by high costs and limited demand growth [1–7]. In the United Kingdom, the largest grocery retailers increased their market shares by investing heavily in new stores during the 1990s [6], but are now facing strong competition from both smaller high-end retailers and discounters. From 2009 to 2014, the combined share of the U.K. grocery retail market of the high-end retailer, Waitrose, and the two leading discounters, Aldi and Lidl, grew from 10 to 13.5%, which corresponds to the lost market share of the largest retailers (<http://www.statista.com/>). The increased competition between the U.K. retailers is now mostly supply-driven, but to a certain extent is also driven by consumer demand [8].

In response to the intense competition, grocery retailers use a variety of marketing strategies and tactics to gain an edge on their competitors. For example, by competing on price via, for instance, price-matching guarantees [8]; use of loss leaders to attract consumers and deter competitors [9]; high-quality and private labels [1]; emphasizing fresh products; wider assortment; location; store design; and size of store to realize economies of scale along the supply chain [10,11]. The focus on quality and private labels—intended to differentiate the retailer and enhance profitability—has led to a continuous stream of new products with ever more attributes [1,3,12]. An important dimension of this evolution has been various claims related to environmentally sustainable production practices [13–17].

A consequence of differentiating products is that many grocery and food products have become complex bundles of attributes. The various attributes provide consumers with signals about a product's

quality, and can be categorized into intrinsic and extrinsic attributes. Intrinsic attributes are part of the physical product and cannot be changed without also changing the physical product itself [18,19]. For seafood, which is the focus here, this could be the actual weight of a product; the way it is cut; or whether it is fresh, frozen, or smoked. Extrinsic attributes are related to the product, but are not part of the physical product itself [19,20]. Examples of extrinsic product attributes are price; brand name; and claims about a product's health benefits, its provenance, and whether it was made using environmentally sustainable production methods.

In the U.K. grocery retail market and elsewhere, extrinsic attributes such as those focusing on environmentally sustainable production methods have become increasingly prevalent, which coincides with consumers' growing awareness of "green" products [15,21–24]. This is especially true for the high-end retailer Marks & Spencer, which recently uploaded "Plan A 2020"; with "the ultimate goal of becoming the world's most sustainable major retailer" (<https://corporate.marksandspencer.com/plan-a>). The strong focus on sustainability indicates that top management at Marks & Spencer perceives this as a viable differentiation strategy vis-à-vis other retailers.

The leading role of the U.K. grocery retail market in terms of product development and quality has spurred research interest in hedonic price modeling for seafood in the market [16,25–28]. Hedonic price modeling is applied to reveal the contribution of specific product attributes to a product's actual price. For product attributes emphasizing sustainability, past research has revealed price premiums of 10–25% for eco-labels on products of Alaska pollock, Atlantic cod, haddock, and salmon in the U.K. grocery retail market [16,25,26,28]. With the exception of Asche et al. [25], these studies do not examine differences in the pricing of attributes across retailers, implicitly assuming that all retailers are identical in their pricing of eco-labels. This is an important gap in the emerging literature on hedonic price modeling of seafood markets, as well as in literature focusing on how and to what extent sustainable resource management can be incentivized by consumer willingness-to-pay. This is so because, although consumer willingness-to-pay for eco-labels is established, real world pricing of eco-labels may be influenced by differences in retailers' strategies to gain market share and profits. For example, as noted above, retailers employ different tactics to attract consumers to their stores, such as loss leaders, and this may also influence the size of eco-label premiums in different retailers. The study conducted by Asche et al. [25] is a case in point as it revealed that wild salmon certified with the Marine Stewardship Council (MSC) label had a high price premium in low-end retailers, but no statistically significant premium in high-end retail chains. Thus, these findings question the ability of the MSC label to transmit consumer willingness-to-pay through the supply chain to incentivize sustainable management of wild salmon fisheries [25].

This paper provides a novel contribution to the sustainability and hedonic price modeling literatures by examining whether retailers differ in their strategies and pricing of eco-labels and other product attributes on a range of haddock products in the U.K. retail market. This study differs from Asche et al. [25] in several ways. First, the present study focuses on haddock, as opposed to wild salmon, which, due to its low availability in the U.K. market, can be considered a niche product. Haddock, on the other hand, is one of the most important seafood products consumed in the United Kingdom. Among the consumers who eat fish, 26% claim to regularly eat haddock at least once a month (<http://www.seafish.org/>). Thus, it is interesting to examine how the same eco-label (MSC) is priced across retailers for two very different fish species.

Second, the present study includes an additional eco-label ("line-caught"), which was not included in Asche et al. [25]. The "Line-Caught" attribute refers to fishing methods based on hook and line, commonly automated longlines. This fishing method has less by-catch of unwanted species and juvenile fish and a lesser impact on the seabed than other fishing methods such as trawling [26]. Thus, it can be considered an eco-label. The study by Sogn-Grundvåg et al. [26] revealed a price premium of 10.4% for chilled haddock in the U.K. market, but did not examine differences between retailers.

Third, unlike Asche et al. [25] and other previous hedonic prices studies of eco-labeled seafood in the United Kingdom [16,25–28], this paper adopts a marketing perspective with a focus on retailers' product strategies and pricing for eco-labels and many other intrinsic and extrinsic product attributes. Thus, this study contributes to the literature by enhancing present knowledge regarding different types of retailers' product differentiation strategies and pricing of eco-labeled seafood.

For the present study, a trained assistant collected a large dataset based on weekly in-store product observations of a range of haddock products in six different U.K. retail chains. These retailers include two high-end retailers (Marks & Spencer and Waitrose, in Glasgow, Scotland) and four large retailers (Asda, Morrisons, Sainsbury's, and Tesco, in Glasgow, Scotland), providing a suitable context to explore different retailers' pricing strategies for eco-labels. Thus, comparisons of price premiums for product attributes between different retailers are used to explore how different types of retailers emphasize and price various product attributes, including eco-labels.

The paper is organized as follows. The following section describes the research design and data. Then, the econometric modeling methodology is presented. Following this, the empirical results are presented. Finally, key results are highlighted and discussed in relation to past research. Implications, limitations, and avenues for future research are also included in the final section of the paper.

2. Research Design and Data

In order to explore retailers' pricing strategies for seafood products, a trained assistant was hired to collect product and price data from six retailers (Tesco, Asda, Sainsbury's, Morrisons, Waitrose, and Marks & Spencer) in Glasgow, Scotland. The assistant collected the continuous weekly data on haddock products sold at the retailers through personal observation. Personal observation has an advantage over scanner data as it provides richer information on product characteristics, particularly for extrinsic attributes [16,28,29]. For example, Roheim et al. [16] had to combine scanner data with personal market observation in order to identify products with the MSC eco-label of the Marine Stewardship Council.

The assistant was carefully trained in all aspects of the work, including procedures for in-store price collection and subsequent recording. All products surveyed were purchased and photographed. Data taken directly from product labels provided detailed information on the various product attributes available [30]. In this way, the assistant's primary role was to make the weekly price observations, as well as to note any changes in the recorded attributes. When changes in products appeared, photographs were updated.

The observations span 137 consecutive weeks (8 November 2010 to 27 May 2013) and include 7772 observations. This includes 107 different haddock products and 5283 observations for the large retailer group, and 30 products and 2489 observations for the high-end retailer group. As a result of product line deletions and additions during the observation period, some products were not observed/recorded throughout the whole sample period.

The products included in the data have a number of different intrinsic and extrinsic attributes. Table 1 summarizes these attributes by retailer. As can be seen, there are three types of preservation and two types of cuts (Note that the study does not include whole fish, steaks, and ready meals where fish only constitute a smaller part of the product). "Loins" refers to the thickest and most valuable part of a fillet. "Fillet" refers to a whole fillet. The attribute "Smoked" refers to cold-smoked, which is a traditional haddock product in the Scottish market. Ingredients such as sauce and butter are typical value-added attributes of haddock. As noted above, "Line-Caught" refers to sustainable fishing methods. The MSC label of the Marine Stewardship Council certifies that the fishery is sustainable [16].

Table 1. The Number of Haddock Products by Retailer and Attribute.

	Large Retailers					High-End Retailers		
	Sum	TESC	ASDA	SAIN	MORS	Sum	WAIT	M & S
No. of products	107	19	33	21	34	30	14	16
Intrinsic attributes								
Preservation								
<i>Fresh</i>	31	1	12	7	11	6	6	0
<i>Chilled</i>	53	10	14	12	17	12	3	9
<i>Frozen *</i>	23	8	7	2	6	12	5	7
Cuts								
<i>Loins</i>	11	2	3	2	4	3	1	2
<i>Fillet *</i>	96	17	30	19	30	27	13	14
Value-added or not								
<i>Smoked</i>	55	10	19	11	15	13	5	8
<i>Not-Smoked *</i>	52	9	14	10	19	17	9	8
<i>Ingredients</i>	17	5	3	2	7	4	1	3
<i>No-Ingredients *</i>	90	14	30	19	27	26	13	13
<i>Boneless/Skinless</i>	12	2	0	3	7	3	0	3
<i>Bone/Skin *</i>	95	17	33	18	27	27	14	13
Weight								
<i>Weight (<280)</i>	21	4	8	4	5	7	1	6
<i>Weight (280–400)</i>	20	4	5	2	9	4	1	3
<i>Weight (>400)</i>	5	3	2	0	0	8	4	4
<i>Individual *</i>	61	8	18	15	20	11	8	3
Extrinsic attributes								
Catch method								
<i>Line-Caught</i>	37	7	6	9	15	18	12	6
<i>Not Line-Caught *</i>	70	12	27	12	19	12	2	10
MSC-Label								
<i>MSC</i>	21	0	7	14	0	3	0	3
<i>Not MSC *</i>	86	19	26	7	34	27	14	13
Brand								
<i>Private labels *</i>	83	16	23	18	26	30	14	16
<i>National brands</i>	24	3	10	3	8	0	0	0
Country-of-origin								
<i>Scotland</i>	7	0	5	1	1	4	1	3
<i>Norway</i>	6	3	0	3	0	0	0	0
<i>Iceland</i>	5	3	0	2	0	9	6	3
<i>No origin *</i>	89	13	28	15	33	17	7	10
Average price (GBP)	11.64	10.28	11.96	13.28	11.31	15.64	14.65	16.26

Note: (1) TESC = Tesco, ASDA = Asda, SAIN = Sainsbury's, MORS = Morrisons, WAIT = Waitrose, and M & S = Marks & Spencer; (2) * base categories in regression; (3) Since the taste and quality of the haddock harvested can be affected by the environment and water quality of the fishing area, the country-of-origin variables can also be indicative of intrinsic qualities of the product such as its quality. Marine Stewardship Council (MSC).

Table 1 shows that the total number of haddock products sold in the four large and two high-end retailer groups was 107 and 30, respectively. On average, the large retailers stock 27 haddock products, whereas the high-end retailers only stock 15 haddock products. Table 1 reveals considerable heterogeneity between the two retailer groups in terms of both intrinsic and extrinsic attributes. For example, for intrinsic attributes, chilled is an important preservation form in the large retailer group and includes approximately 50% of products, compared with 40% for the high-end retailers. The share for frozen products is 25% for the large retailer group and 40% for the high-end retailers.

For extrinsic attributes, the presence of the two eco-labels varies considerably. The share of line-caught products in the large retailer group was 35%, which was much lower than in the high-end group where 60% of haddock products had this label. There were, however, substantial differences between the two high-end retailers, as 86% of the products stocked by Waitrose were line-caught, whereas only 38% of products sold by Marks & Spencer were line-caught. The heterogeneity between the retailers is also evident when considering the extent of MSC labeling. The percentage of MSC-labeled haddock was approximately 20% for the large retailer group, whereas 67% of Sainsbury's haddock were MSC-labeled. Only 10% of the haddock in Marks & Spencer, and none in Waitrose, had the MSC label. These observations show large variations in the use of eco-labels both between and within the two retailer groups.

Branding by the use of private labels rather than national brand (e.g., Birds Eye and Young's) is an important component of retailers' marketing strategies [12,31]. This was also the case for the two high-end retailers, where haddock products were sold exclusively under private labels. For the large retailer group, the share of private labeled haddock was about 78% on average, ranging between 70% and 86%.

For country-of-origin labeling, it can be seen from Table 1 that three origins feature on products, namely, Scotland, Norway, and Iceland. In the large retailer group, only 18 out of the 107 (17%) products had such labeling, which is considerably less than for the high-end retailers, where 13 out of 30 (43%) products were labeled with country-of-origin.

An important question is whether the results are valid across the U.K. market. Although national pricing strategies are the norm in U.K. grocery retailing [32–35], consumer preferences and demand for different species and attributes may vary across different regions of the country. This may lead to some regional price differences for different species and attributes at certain times. For example, Roheim et al. [25] found that the retail market for frozen seafood in two different regions (London metropolitan area and the Lancashire area) had different valuations of different attributes. This indicates that the valuation of attributes may also vary across the country. However, the demographic and cultural mix of the Glasgow population may be sufficiently varied to capture some of this national variation. In addition, ad hoc checks were done of the products when visiting these stores elsewhere in the United Kingdom, and revealed no significant deviation.

3. Methodology

Hedonic price modeling, which relies on characteristics theory, was proposed by Lancaster [36] and further developed by Rosen [37] and Ladd [38]. Characteristics theory assumes that consumers derive utility directly from quality attributes inherent in a good [36]. The actual price of the good can be considered as the sum of the implicit prices of those attributes [37]. A basic premise of hedonic price analysis is that of perfect competition, where market clearing conditions are required as consumers maximize utility depending on product attributes and expenditure constraints and as retailers maximize profit under the constraints of factor costs and available technology [37,39]. Nevertheless, attribute prices still reflect consumers' valuation of product attributes, although prices are assumed to be set by retailers on the basis of demand elasticities of attributes, rather than factor costs [40,41]. High concentration in the U.K. food supply chains implies that retailers with a high market share may try to exploit their market power [6,42–44]. Therefore, the estimated monetary values of product attributes found in this study may be associated with retailers' pricing strategies.

The theoretical foundation for the hedonic price model provides little guidance on the functional form. In the literature, hedonic price modeling has been applied with both a linear formulation [45–48] and a logarithmic formulation [16,25–27,49]. Estimates of dummy variables from the semi-logarithmic hedonic model are interpreted as price premiums in percentage terms, after taking the variance of the estimates into account [50]. Unlike the semi-logarithmic model, the linear hedonic model is interpreted directly as price premiums of attributes in monetary values. As base haddock products sold in the large retailers and high-end retailers have different prices, the price premiums in percentage

(of the base price) for haddock in these two types of marketplaces may not be comparable. Accordingly, in this study, a linear hedonic price model was applied.

The six retailers were categorized in two groups. The “Big 4” retailers—Tesco, Asda, Sainsbury’s, and Morrisons—which have dominated U.K. grocery retailing over the past decade, with three quarters of U.K. grocery sales [34], constitute a group labeled “large retailers”. The two upmarket retailers, Waitrose and Marks & Spencer, constitute the second group labeled “high-end retailers”. Consequently, the hedonic models were specified with regards to the large retailer group and the high-end retailer group. As shown in Table 1, haddock prices in the large retailer group ranged between GBP10.28 and 13.28, with an average of GBP11.64. For the two high-end retailers, the average price was GBP15.64, indicating substantial differences in strategies between the two groups, both in terms of product quality and pricing. Another reason for analyzing retailer groups rather than individual retailers was the existence of multicollinearity in the data for some retailers. However, we added interaction terms between eco-labels and retailers to test for differences between retailers’ pricing strategies for eco-labels.

The dummy-coding method is commonly applied to specify the hedonic model [16,49,51]. Thus, the monetary value of each attribute is relative to a chosen base product/attribute. For the large retailer group, the base product had the following attributes: frozen, fillet, non-smoked, without ingredients, with bone and skin-on, individual weight, not line-caught, not MSC-labeled, private label, without country-of-origin, and not on promotion. Trend and seasonal dummy variables were also included to capture the deterministic components of the haddock price. This specification yields the following linear hedonic price model for the large retailer group (model 1):

$$\begin{aligned}
 p_i = a_0 &+ b_1 \text{Fresh} + b_2 \text{Chilled} + c_1 \text{Loins} + d_1 \text{Smoked} + e_1 \text{Ingredients} \\
 &+ f_1 \text{Boneless/Skinless} + g_1 \text{Weight}(< 280) \\
 &+ g_2 \text{Weight}(280 \sim 400) + g_3 \text{Weight}(> 400) + h_1 \text{Line} + i_1 \text{MSC} \\
 &+ j_1 \text{National_Brand} + k_1 \text{Scotland} + k_2 \text{Norway} + k_3 \text{Iceland} \\
 &+ l_1 \text{Promotion} + n_1 \text{Trend} + s_1 \text{Spring} + s_2 \text{Summer} + s_3 \text{Autumn} \\
 &+ \text{Residual}
 \end{aligned} \tag{1}$$

where p_i represents the i th haddock price in GBP per kilogram, and other variables, except for *Promotion*, *Trend*, and seasonal dummies, are listed in Table 1. The value-added attributes (especially intrinsic attributes) were included in the model (e.g., *Fresh*, *Loins*). In other words, the base variables were typically of lesser value (e.g., *Frozen*, *Fillet*). This specification indicates that the estimated coefficients were expected to be positive and imply price premiums.

For the high-end retailer group, the model was written as (model 2):

$$\begin{aligned}
 p_i = a_0 &+ b_1 \text{Fresh} + b_2 \text{Chilled} + c_1 \text{Loins} + d_1 \text{Smoked} + e_1 \text{Ingredients} \\
 &+ f_1 \text{Boneless/Skinless} + g_1 \text{Weight}(< 280) \\
 &+ g_2 \text{Weight}(280 \sim 400) + g_3 \text{Weight}(> 400) + h_1 \text{Line} + i_1 \text{MSC} \\
 &+ k_1 \text{Scotland} + k_3 \text{Iceland} + l_1 \text{Promotion} + m_1 \text{Waitrose} \\
 &+ m_2 \text{Waitrose : Line} + n_1 \text{Trend} + s_1 \text{Spring} + s_2 \text{Summer} \\
 &+ s_3 \text{Autumn} + \text{Residual}
 \end{aligned} \tag{2}$$

Unlike model (1), model (2) for the high-end retailer group did not contain country-of-origin variables because of the nature of the data. In addition, the dummy variable *Waitrose* was added to test for price premiums relative to the base product in Marks & Spencer. An interaction term between *Waitrose* and *Line-Caught* was further incorporated in the specification to test for any differences in price premiums for line-caught haddock sold in Waitrose and Marks & Spencer.

Table 2 shows descriptive statistics for the variables in the model for the large retailer group and the small retail group. Although the average price in the large retail group was smaller than in the high-end retailer group, its price had a higher level of fluctuations, as indicated by the larger

standard deviation. The dummy-coding technique implies that the reported mean is the share of observations within each attribute group. The fresh haddock products with ingredients appeared more frequently in the large supermarkets than in the high-end supermarkets. Line-caught haddock was observed more frequently in high-end supermarkets, while the large retailers provided more MSC-labelled haddock.

Table 2. Descriptive Statistics.

Variable	Large Retailers		High-End Retailers	
	Mean	Standard Dev.	Mean	Standard Dev.
Intrinsic attributes				
<i>Fresh</i>	0.44	0.50	0.19	0.39
<i>Chilled</i>	0.35	0.48	0.49	0.50
<i>Loin</i>	0.15	0.36	0.14	0.35
<i>Smoked</i>	0.55	0.50	0.52	0.50
<i>Ingredients</i>	0.17	0.37	0.08	0.28
<i>Boneless/Skinless</i>	0.11	0.31	0.12	0.33
<i>Weight (<280)</i>	0.18	0.38	0.18	0.38
<i>Weight (280–400)</i>	0.18	0.39	0.15	0.36
<i>Weight (>400)</i>	0.04	0.20	0.27	0.44
Extrinsic attributes				
<i>Price</i>	11.65	2.79	15.64	2.53
<i>Line-Caught</i>	0.39	0.49	0.63	0.48
<i>MSC</i>	0.20	0.40	0.13	0.34
<i>National Brand</i>	0.15	0.36		
<i>Scotland</i>	0.10	0.30	0.11	0.31
<i>Norway</i>	0.05	0.21		
<i>Iceland</i>	0.05	0.22	0.24	0.43
<i>Promotion</i>	0.12	0.33	0.08	0.28
Seasonal dummy				
<i>Spring</i>	0.29	0.45	0.28	0.45
<i>Summer</i>	0.28	0.45	0.27	0.45
<i>Autumn</i>	0.18	0.39	0.19	0.39

4. Estimation Results

We estimated model (1) for the large retailers and model (2) for the high-end retailers. There were 107 products and a total of 5283 observations for the large retailers group, and 30 products and 2489 observations for the high-end retailers group. Since dummy-coding was applied in the linear hedonic model, the estimates were interpreted directly as the monetary values of product attributes. For these two models, the base products are very similar in terms of both intrinsic and extrinsic attributes. The selection of a similar base product facilitates comparisons of price premiums of different product attributes of haddock sold in the two retailer groups.

The estimation results are reported in Table 3. The robust standard errors were estimated on a two-dimensional cluster, containing time (weeks) and product types, to correct estimation bias due to correlations between the clusters [52]. Table 3 shows that the R^2 value is 0.63 for the large retailer group and 0.71 for the high-end group, indicating that the model explains 63% and 71% of price variation in the large and high-end retailer groups, respectively. A smaller R^2 value for the large retailer group implies more unobserved factors explaining price variation for this group, which may relate to their more divergent range of products and attributes during the sample period.

Table 3. Estimate from the Hedonic Price Model for Haddock.

Variable	Large Retailers (Model 1)		High-End Retailers (Model 2)	
	Estimate	Standard Error	Estimate	Standard Error
Intercept	8.215 ^a	0.165	13.17 ^a	0.218
Intrinsic attributes				
<i>Fresh</i>	1.354 ^a	0.164	0.333 ^b	0.146
<i>Chilled</i>	1.361 ^a	0.160	1.620 ^a	0.130
<i>Loins</i>	3.869 ^a	0.078	3.466 ^a	0.106
<i>Smoked</i>	0.143 ^a	0.051	−0.276 ^a	0.076
<i>Ingredients</i>	1.732 ^a	0.105	0.516 ^a	0.151
<i>Boneless/Skinless</i>	0.271 ^a	0.093	0.346 ^b	0.168
<i>Weight (<280)</i>	1.506 ^a	0.074	1.027 ^a	0.159
<i>Weight (280–400)</i>	−1.001 ^a	0.155	−0.246 ^b	0.122
<i>Weight (>400)</i>	−1.766 ^a	0.181	0.340 ^b	0.172
Extrinsic attributes				
<i>Line-Caught</i>	0.116 ^c	0.067	2.181 ^a	0.135
<i>MSC</i>	0.957 ^a	0.076	0.732 ^a	0.143
<i>National Brand</i>	2.340 ^a	0.110		
<i>Scotland</i>	1.810 ^a	0.108	1.334 ^a	0.129
<i>Norway</i>	0.674 ^a	0.125		
<i>Iceland</i>	0.801 ^a	0.151	−1.068 ^a	0.146
<i>Promotion</i>	−0.368 ^a	0.084	−0.770 ^a	0.112
<i>Waitrose</i>			0.535 ^b	0.226
<i>Waitrose: Line</i>			−1.962 ^a	0.221
<i>Trend</i>	0.008 ^a	0.001	0.003 ^a	0.001
Seasonal dummy				
<i>Spring</i>	−0.027	0.065	−0.093 ^a	0.081
<i>Summer</i>	−0.036	0.067	−0.110 ^a	0.076
<i>Autumn</i>	−0.144 ^b	0.071	0.130 ^c	0.080
<i>Trend</i>	0.008 ^a	0.001	0.003 ^a	0.001
<i>R²</i>	0.63		0.71	
No. of observations	5283		2489	
<i>F</i> -test	$p < 0.001$		$p < 0.001$	

Note: ^a significance level = 0.01; ^b significance level = 0.05; ^c significance level = 0.10.

Before analyzing estimates of attributes, we discuss the coefficient of *Trend* and seasonal dummies. The coefficient of *Trend* is significant in both models. During the sample period, the large retailers increased the price by an average of GBP0.008 every week, whilst the high-end retailers only increased the average price by GBP0.003 per week. Haddock prices seem to vary across seasons in the high-end retailers, but not in the large retailers. *Autumn* is the only seasonal dummy that is statistically significant in the two models, with coefficients of 0.144 for the large retailer group and 0.130 for the high-end group. All seasonality dummy variables are significant in the high-end retailers, which may well reflect their flexible and active adjustments to changes in market conditions.

4.1. Intrinsic Attributes

Since the intrinsic attributes of the base product (e.g., frozen, fillet) are generally less valued, the variables included in the specification are “value-added” attributes. A positive coefficient means a price premium over the base. With the exception of weights in the two groups and *Smoked* in the high-end retailer group, all coefficients are positive (and significant) in the two models. The coefficient for *Smoked* is only GBP0.143 (1.74% over the base price) in the large retailer group, but is negative in the high-end retailer group (−0.276, −2.1% under the base price). Although the coefficient for the *Smoked* attribute has an opposite sign in the two models, they are very small in absolute terms.

The *Fresh* and *Chilled* attributes gain almost the same premiums over the base (GBP1.354 versus GBP1.361, respectively) in the large retailer group, which is also close to the monetary value of *Chilled* (GBP 1.620) in the high-end retail group. The fresh haddock, which is provided by Waitrose only in the high-end group, gains only GBP0.333 price premium. A possibility is that the fresh product is used as an incentive to attract consumers and to increase the sales of other products, which is built on a broader profit maximizing strategy across the collection of products [9,45]. When compared with conservation (*Fresh* and *Chilled*), product cuts (*Loins* or other form) play a more important role in the pricing strategy. The estimated monetary value of *Loins* is GBP3.869 for the large retailers and GBP3.466 for the small retailers. Both are the most valued attribute when compared with other attributes inherent in haddock products sold in the two groups.

The price premium for ingredients (sauce and butter) is GBP1.732 in the large retailer group and GBP0.516 in the high-end group. This difference may relate to differences in the costs of the added ingredients. By contrast, price premiums for “boneless/skinless” are not very different between the two groups of retailers (GBP0.271 versus GBP0.346).

4.2. Extrinsic Attributes

Price is an important product attribute, affecting consumers’ purchasing decisions. As reflected in Equations (1) and (2), setting all dummy variables to zero implies that the value of the intercept equals the price of the base product. The estimated intercept is GBP8.215 for the large retailers and GBP13.17 for the high-end retailers. Keeping the dummy variable *Waitrose* (=1) yields the price of the base product at Waitrose, that is, GBP13.705 (=13.17 + 0.535). These large price differences of the base products sold in the two retailer groups suggest that the high-end retailers source products of substantially higher quality (and price) than the large retailers. Unfortunately, our data do not provide information about the actual product quality (and price) of the base products sourced by the retailers in our study. However, at the time of the study, Waitrose had a policy of only sourcing and selling/marketing haddock (and other species of whitefish) that had not been previously frozen. Fresh haddock of a high quality will generally be more expensive than frozen haddock. In other retailers, frozen fillets were commonly thawed, packed, and sold as chilled products (In the more general literature, there is a well-documented relationship between price and quality [53]). An additional contributing factor may of course be that the smaller volumes purchased by the high-end retailers preclude price parity with the buying power of their larger rivals, but unfortunately these data are not available.

All retailers use sales promotions. Not surprisingly, the results indicate a significant negative impact of sales promotion on price in the two groups. As shown in Table 3, the coefficient of *Promotion* is −0.368 and −0.77 for the large retailer group and the high-end retail group, respectively. However, the price premiums, expressed in percentage terms of the base price, are not substantially different, that is, −4.5% for the large retailer group and −5.8% for the high-end retailers. The deep promotion in terms of price reduction accompanied with the high base value (the estimated intercept) provides a possible explanation for the success of the high-end retailers. As observed by Bezawada and Pauwels [1], a regular price reduction is less effective than deep promotion by further lowering the regular price. Then, retailers can raise the regular price while offering deep promotion to attract consumers.

Most of the coefficients for the remaining extrinsic attributes are significant and positive in the two models. For the two eco-labels (*Line-Caught* and *MSC*), the estimated coefficients are significant and positive, but with substantially different magnitudes. The monetary value of the line-caught label in Marks & Spencer is GBP2.181, whereas it is only GBP0.219 in Waitrose (calculated by the sum of the coefficients of *Line-Caught* and the interaction term *Waitrose: Line*, i.e., 2.181−1.962). In percentage terms of the base product, price premiums for the line-caught attribute are 16.6% in Marks & Spencer and only 1.6% in Waitrose. The fact that the two high-end retailers differ so much in the pricing of the line-caught attribute is surprising. The cost of sourcing line-caught haddock should not differ very much between the two high-end retailers and the hedonic model controls for the influence of

country-of-origin at least to the extent that this is reflected in the information provided on the products. The model also controls for the influence of size of fillets, type of cuts, boneless/skinless, and so on.

A possible explanation can be differences in management perceptions between Waitrose and Marks & Spencer regarding the importance of the high general market positions they both hold (with very high prices of the base product when compared with the large retailers) versus emphasizing differentiation of specific attributes, such as line-caught. Perhaps management at Waitrose, in contrast to management at Marks & Spencer, believes that the general market position is such (high-end) that they feel it less necessary to differentiate to the same extent on line-caught.

For the large retailer group, the coefficient for the line-caught attribute is significant, but only GBP0.116. The low price of the base product (intercept) means that this implies only a 1.4% price premium. Table 3 further shows that the average price premium for the MSC eco-label is GBP0.957 for the large retailer group and GBP0.732 for Marks & Spencer (note that Waitrose did not stock haddock with the MSC label). When relating these premiums to the respective base prices for haddock for the two retailer groups (GBP8.215 and GBP13.17 for the large and high-end groups, respectively), it is evident that the large retailer group charges a much higher price premium than does Marks & Spencer, that is, 11.9% versus 5.6%, respectively. With the higher base price, however, Marks & Spencer still charges a much higher price for the product. Similar results were reported by Asche et al. [25] for salmon in the United Kingdom and by Asche and Bronnmann [51,54] for whitefish in Germany.

All haddock in the two high-end retailers had private labels. Consequently, the hedonic model can only reveal the price premiums of national brands compared with private labels in the large retailer group. On average, the monetary value of the premium for national brands (2.34) is more than double the value of private labels, *ceteris paribus*. Different pricing strategies for private and national brands among the U.K. grocery retailers were also found by Volpe and Li [12]. Moreover, the lower premium of private labels may reflect the nature of price competition between retailers and may be used as a tool to build and develop consumers' store loyalty [5,31].

It is well established that consumers generally perceive home country-of-origin as being of higher quality than foreign origin [55]. Thus, it is unsurprising that Scottish origin gains a price premium compared with products without information about country-of-origin in both groups, that is, GBP1.81 in the large retail group and GBP1.334 in the high-end group, corresponding to 22% and 10% price premiums, respectively. In the large retailer group, the price premium for Norwegian and Icelandic haddock is GBP0.674 (8.2%) and GBP0.801 (9.8%), respectively, and these premiums are not statistically different from each other. Hence, while not as valuable as domestic haddock, country-of-origin still seems to be a quality signal. In the high-end group, Icelandic products are in fact cheaper than products without information about country-of-origin; no Norwegian products are carried; and these retailers do not use country-of-origin as a quality indicator, unlike the large retailers.

5. Concluding Remarks

This paper contributes to the sustainability and hedonic price modeling literatures by exploring whether retailers differ in their pricing of two eco-labels, as well as other product attributes, on a range of haddock products in the U.K. retail market. The key findings of the study are as follows. First, the monetary values of the same attributes differ between the large and high-end retailer groups, and also between retailers in the same group. Second, the MSC label has a somewhat lower monetary value in the high-end retailer groups, thus adding to the study conducted by Asche et al. [25] that revealed a premium for the label in large retailers, but no significant premium in high-end retailers. Generally, the large retailer group demands a higher premium for all attributes, while the high-end retailers that charge a higher base price charge less for different product attributes. For example, the price premium for ingredients in the large retailer group is more than three times larger than in the high-end retailer group. The only statistically significant exception is the line-caught attribute. In the large retailer group, the value of the line-caught attribute is negligible, but it is the second highest valued attribute (after loins) in Marks & Spencer.

Third, the results show very different premiums charged for the MSC and line-caught labels in Marks & Spencer, possibly reflecting different management perceptions regarding these attributes. This also coincides with Marks & Spencer's product portfolio. During the sample period of this study, the number of haddock products with the line-caught label was twice that of haddock with the MSC label. Thus, in Marks & Spencer, the line-caught attribute seemingly plays a key role in their advocacy of sustainable haddock products, which also should contribute to their stated aim to become the world's most sustainable major retailer. It is interesting to note the much higher premium on line-caught haddock, which, due to the higher price, will lead to a lower quantity being demanded with a normally downward-sloping demand schedule. Moreover, this is not a strategy followed by Waitrose, who have a relatively low premium on line-caught haddock, but an even higher base price.

The results for the estimated monetary values of individual product attributes also shed light on the retailers' marketing strategies and general market position. The price of the base haddock product sold in Waitrose is about 42% more expensive than the average base price for haddock in the large retail group. This may relate to the general market position of Waitrose when compared with the retailers in the large retail group. The higher initial price also enables greater opportunity for deep promotion, as reflected by the estimated effect of promotion. According to Bezawada and Pauwels [1], this provides scope for retailers to keep the regular price high, whilst periodically offering deep promotions to attract consumers. Such an approach may also be reinforced by a similar approach throughout the retailers' food products range, or indeed as a means of attracting wider product range interest through this fish-specific promotion. It also provides scope to provide extrinsic attributes such as eco-labels at a lower premium than retailers with lower prices.

In conclusion, this study represents an important step forward in demonstrating differences in retailer pricing strategies related to eco-labels, including that some retailers do not charge a premium for some. This exploration of haddock could usefully be extended to other segments of the seafood product range and indeed beyond into broader food categories. Larger-scale analysis over more commodities remains an issue for future researchers.

Author Contributions: D.Z. conducted the econometric analysis and wrote the paper together with G.S.-G., G.S.-G. and J.A.Y. designed the data collection and instructed the research assistant. F.A. and J.A.Y. revised the paper and participated in formulating the research questions with D.Z. and G.S.-G. All authors contributed significantly to the manuscript.

Acknowledgments: The authors acknowledge the very useful comments provided by three anonymous reviewers. The authors also thank Duncan J. Young for meticulous data collection and the Norwegian Research Council, the Fishery and Aquaculture Industry Research Fund, and the Ministry of Fisheries and Coastal Affairs for financial support.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Bezawada, R.; Pauwels, K. What is special about marketing organic products? How organic assortment, price, and promotions drive retailer performance. *J. Mark.* **2013**, *77*, 31–51. [\[CrossRef\]](#)
2. Jia, P. What happens when Wal-Mart comes to town: An empirical analysis of the discount retailing industry. *Econometrica* **2008**, *76*, 1263–1316.
3. Keller, K.L. Conceptualizing, measuring, and managing customer-based brand equity. *J. Mark.* **1993**, *57*, 1–22. [\[CrossRef\]](#)
4. Moore, M. Towards a confirmatory model of retail strategy types: An empirical test of miles and snow. *J. Bus. Res.* **2005**, *58*, 696–704. [\[CrossRef\]](#)
5. Revoredo-Giha, C.; Renwick, A. Retailers price behavior in the UK fresh fruit and vegetable market. *Agribusiness* **2012**, *28*, 451–468. [\[CrossRef\]](#)
6. Smith, H. Supermarket choice and supermarket competition in market equilibrium. *Rev. Econ. Stud.* **2004**, *71*, 235–263. [\[CrossRef\]](#)

7. Wrigley, N.; Lowe, M. The Globalization of Trade in Retail Services—Report commissioned by the OECD Trade Policy Linkages and Services Division for the OECD Experts Meeting on Distribution Services. Available online: <https://eprints.soton.ac.uk/169193/> (accessed on 5 August 2017).
8. Hess, J.D.; Gerstner, E. Price-matching policies: An empirical case. *Manag. Decis. Econ.* **1991**, *12*, 305–315. [[CrossRef](#)]
9. Lal, R.; Matutes, C. Retail pricing and advertising strategies. *J. Bus.* **1994**, *67*, 345–370. [[CrossRef](#)]
10. Guy, C.; Bennison, D.; Clarke, R. Scale economies and superstore retailing: New evidence from the UK. *J. Retail. Consum. Serv.* **2005**, *12*, 73–81. [[CrossRef](#)]
11. Levy, M.L.; Weitz, B.A. *Retailing Management*; McGraw-Hill Irwin: Boston, MA, USA, 2001.
12. Volpe, R.J.; Li, C. On the frequency, depth, and duration of sales at high–low pricing supermarkets. *Agribusiness* **2012**, *28*, 375. [[CrossRef](#)]
13. Carlucci, D.; Devetiis, B.; Nardone, G.; Santeramo, F.G. Certification labels versus convenience formats: What drives the market in aquaculture products. *Mar. Resour. Econ.* **2017**, *32*, 295–310. [[CrossRef](#)]
14. Jaffry, S.; Pickering, H.; Ghulam, Y.; Whitmarsh, D.; Wattage, P. Consumer choices for quality and sustainability labelled seafood products in the UK. *Food Policy* **2004**, *29*, 215–228. [[CrossRef](#)]
15. Rickertsen, K.; Alfnes, F.; Combris, P.; Enderl, G.; Issanchou, S.; Shogren, J.F. French Consumers’ attitudes and preferences toward wild and farmed fish. *Mar. Res. Econ.* **2017**, *32*, 59–81. [[CrossRef](#)]
16. Roheim, C.A.; Asche, F.; Santos, J.I. The elusive price premium for ecolabelled products: Evidence from seafood in the UK market. *J. Agric. Econ.* **2011**, *62*, 655–668. [[CrossRef](#)]
17. Wakamatsu, H.; Anderson, C.M.; Uchida, H.; Roheim, C.A. Pricing ecolabeled seafood products with heterogenous preferences: An auction experiment in Japan. *Mar. Resour. Econ.* **2017**, *32*, 277–294. [[CrossRef](#)]
18. Olson, J.C.; Jacoby, J. Cue utilization in the quality perception process. In Proceedings of the Third Annual Conference of the Association for Consumer Research, Chicago, IL, USA, 3–5 November 1972; pp. 168–179.
19. Olson, J.C. Price as an informational cue: Effects in product evaluation. In *Consumer and Industrial Buying Behavior*; Woodside, A.G., Sheth, J.N., Bennet, P.D., Eds.; North-Holland Publishers: New York, NY, USA, 1977; pp. 267–286.
20. Zeithaml, V.A. Consumer perceptions of price, quality, and value: A means–end model and synthesis of evidence. *J. Mark.* **1988**, *52*, 2–22. [[CrossRef](#)]
21. Alfnes, F.; Chen, X.; Rickertsen, K. Labeling farmed seafood: A review. *Aquacult. Econ. Manag.* **2018**, *22*, 1–26. [[CrossRef](#)]
22. Bell, D.E.; Sanghavi, N.; Winig, L. Marks and Spencer: Plan A. Available online: <https://www.hbs.edu/faculty/Pages/item.aspx?num=36729> (accessed on 5 November 2016).
23. Grayson, D. Embedding corporate responsibility and sustainability: Marks & Spencer. *J. Manag. Dev.* **2011**, *30*, 1017–1026.
24. Yiridoe, E.K.; Bonti-Ankomah, S.; Martin, R.C. Comparison of consumer perceptions and preference toward organic versus conventionally produced foods: A review and update of the literature. *Renew. Agric. Food Syst.* **2005**, *20*, 193–205. [[CrossRef](#)]
25. Asche, F.; Larsen, T.A.; Smith, M.D.; Sogn–Grundvåg, G.; Young, J.A. Pricing of eco-labels with retailer heterogeneity. *Food Policy* **2015**, *67*, 82–93. [[CrossRef](#)]
26. Sogn–Grundvåg, G.; Larsen, T.A.; Young, J.A. The value of line-caught and other attributes: An exploration of price premiums for chilled fish in UK supermarkets. *Mar. Policy* **2013**, *38*, 41–44. [[CrossRef](#)]
27. Roheim, C.A.; Gardiner, L.; Asche, F. Value of brands and other attributes: Hedonic analysis of retail frozen fish in the UK. *Mar. Resour. Econ.* **2007**, *22*, 239–253. [[CrossRef](#)]
28. Sogn–Grundvåg, G.; Larsen, T.A.; Young, J.A. Product differentiation with credence attributes and private labels: The case of whitefish in UK Supermarkets. *J. Agric. Econ.* **2014**, *65*, 368–382. [[CrossRef](#)]
29. Ward, C.E.; Lusk, J.L.; Dutton, J.M. Implicit value of retail beef product attributes. *J. Agric. Resour. Econ.* **2008**, *33*, 364–381.
30. Mojduszka, E.M.; Caswell, J.A. A test of nutritional quality signaling in food markets prior to implementation of mandatory labeling. *Am. J. Agric. Econ.* **2000**, *82*, 298–309. [[CrossRef](#)]
31. Burt, S.; Sparks, L.; Teller, C. Retailing in the United Kingdom—A synopsis. *Euro. Retail Res.* **2010**, *20*, 173–194.
32. Competitive Commission. *Report on the Supply of Groceries from Multiple Stores in the United Kingdom*, CM; HMSO: London, UK, 2000.

33. Competitive Commission. *The Supply of Groceries in the UK*; TSO: London, UK, 2008.
34. Lan, H.; Dobson, P.W. Healthy competition to support healthy eating? An investigation of fruit and vegetable pricing in UK supermarkets. *J. Agric. Econ.* **2017**, *68*, 881–900. [[CrossRef](#)]
35. Lloyd, T.A.; McCorriston, S.; Morgan, C.W.; Poen, E.; Zgovu, E. Retail price dynamics and retailer heterogeneity: UK evidence. *Econ. Lett.* **2014**, *124*, 434–438. [[CrossRef](#)]
36. Lancaster, K.J. A new approach to consumer theory. *J. Political Econ.* **1966**, *74*, 132–157. [[CrossRef](#)]
37. Rosen, S. Hedonic prices and implicit markets: Product differentiation in pure competition. *J. Political Econ.* **1974**, *82*, 34–55. [[CrossRef](#)]
38. Ladd, G.W.; Zober, M. Model of consumer reaction to product characteristics. *J. Consum. Res.* **1977**, *4*, 89–101. [[CrossRef](#)]
39. Nerlove, M. Hedonic price functions and the measurement of preferences: The case of Swedish wine consumers. *Eur. Econ. Rev.* **1995**, *39*, 1697–1716. [[CrossRef](#)]
40. Feenstra, R.C. Exact hedonic price indexes. *Rev. Econ. Stat.* **1995**, *77*, 634–653. [[CrossRef](#)]
41. Hassan, D.; Monier-Dilhan, S. National brands and store brands: Competition through public quality labels. *Agribusiness* **2006**, *22*, 21–30. [[CrossRef](#)]
42. Cooper, D. Findings from the Competition Commission's inquiry into supermarkets. *J. Agric. Econ.* **2003**, *54*, 127–143. [[CrossRef](#)]
43. Dobson, P.; Waterson, M. Retailer power: How regulators should respond to greater concentration in retailing. *Econ. Policy* **1999**, *14*, 133–164. [[CrossRef](#)]
44. Dobson, P.W.; Waterson, M.; Davies, S.W. The patterns and implications of increasing concentration in European food retailing. *J. Agric. Econ.* **2003**, *54*, 111–125. [[CrossRef](#)]
45. Asche, F.; Guillen, J. The importance of fishing method, gear and origin: The Spanish hake market. *Mar. Policy* **2012**, *36*, 365–369. [[CrossRef](#)]
46. Carew, R.; Florkowski, W.J.; Smith, E.G. Hedonic analysis of apple attributes in metropolitan markets of Western Canada. *Agribusiness* **2012**, *28*, 293–309. [[CrossRef](#)]
47. Smith, T.A.; Huang, C.L.; Lin, B.H. Estimating organic premiums in the US fluid milk market. *Renew. Agric. Food Syst.* **2009**, *24*, 197–204. [[CrossRef](#)]
48. Vickner, S.S. Estimating the implicit price of convenience: A hedonic analysis of the US breakfast sausage market. *Agribusiness* **2015**, *31*, 281–292. [[CrossRef](#)]
49. Martínez-Garmendia, J. Application of hedonic price modeling to consumer packaged goods using store scanner data. *J. Bus. Res.* **2010**, *63*, 690–696. [[CrossRef](#)]
50. Kennedy, P.E. Estimation with correctly interpreted dummy variables in semilogarithmic equations. *Am. Econ. Rev.* **1981**, *71*, 802.
51. Asche, F.; Bronnmann, J. Price Premiums for Ecolabelled Seafood: Marine Stewardship Council (MSC) Certification in Germany. *Aust. J. Agric. Resour. Econ.* **2017**, *61*, 576–589. [[CrossRef](#)]
52. Wooldridge, J.M. Cluster-sample methods in applied econometrics. *Am. Econ. Rev.* **2003**, *93*, 133–138. [[CrossRef](#)]
53. Feenstra, R.C.; Romalis, J. International Prices and Endogenous Quality. *Q. J. Econ.* **2014**, *129*, 477–527. [[CrossRef](#)]
54. Bronnmann, J.; Asche, F. The value of product attributes, brands and private labels: An analysis of frozen seafood in Germany. *J. Agric. Econ.* **2016**, *67*, 231–244. [[CrossRef](#)]
55. Verlegh, P.W.J.; Steenkamp, J.-B.E.M. A review and meta-analysis of country-of-origin research. *J. Econ. Psychol.* **1999**, *20*, 521–546. [[CrossRef](#)]

